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SURVEY OF THE PRODUCTION AND MARKETING OF POTATOES IN ALBERTA

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CANADA DEPARTMENT OF AGRICULTURE

MARKETING SERVICE ECONOMICS DIVISION



PREFACE

The Economics Division of the Canada Department of Agriculture undertook this study of production and marketing of potatoes in Alberta on the request of the Potato Production and Improvement Committee, an organization which represents the interests of commercial potato producers in Alberta. Information for this study was obtained chiefly by the survey method. In 1950 farmers were interviewed to obtain information on farm organization and current cultural and production practices. In 1951 wholesale firms were interviewed to obtain information on some of the marketing problems facing the potato industry. Additional information for this study was obtained from the Crops Branch of the Alberta Department of Agriculture and the inspector of seed potatoes of the Plant Protection Division of the Canada Department of Agriculture.



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SURVEY OF THE PRODUCTION AND MARKETING OF POTATOES IN ALBERTA 1/

THE POTATO INDUSTRY IN ALBERTA

The potato industry in Alberta has experienced several important changes in the last three decades. The earlier changes originated from a shifting of a large portion of potato production from dryland to irrigated areas. This shift favoured the development of a high degree of mechanization and an increase in the size and commercialization of the individual potato enterprises. The more recent changes originated from the changed nature of consumer demand for potatoes. Potatoes are a staple item in the diet of most consumers, and as such their level of consumption tends to remain constant or even decline with an increase in income.^{2/} Thus the increase in incomes which occurred since 1939 had very little effect on the level of potato consumption, but affected other aspects of the demand pattern. Consumers are demanding more out-of-season potatoes, and better quality and more uniform appearance of the tubers; also they are demanding more packaging of potatoes in small packages rather than in 100 pound bags. This changed demand pattern resulted in some changes in the marketing and production practices in the industry. An increased demand for early potatoes resulted in more imports; it also led to the production of some early varieties by commercial producers in Alberta. The increased demand for quality in potatoes induced producers to adopt improved cultural practices: seed and soil selection, disease and pest control, and the adoption of a proper rotation have become necessary for successful potato production.

Trends in Output

A wide adaptation to soil and climatic conditions make potato production suitable over a large area of the province. In 1951, 46,000 or about 55 per cent of the total of 84,000 farmers in Alberta reported some potato production.^{3/} This does not represent the total number of potato producers in the province as some potato production is undertaken by families living in the urban centres of the province; it is estimated that five per cent of the households in cities with

1/ The production study was made in 1950 by B.J. Bowlen and J.A. Parfett. The marketing study was made in 1951 by J.A. Parfett, who also prepared a preliminary draft of the present report. The material was reviewed and the present report prepared by Wm. Darcovich.

2/ The consumption of potatoes in the 1935-39 period was 192 and in the 1946-50 period 188 pounds per capita per annum. The data support the statement that potato consumption remained approximately constant, or declined, despite the increase in income which occurred between the two time intervals.

3/ Ninth Census of Canada, 1951.

a population of 30,000 and over, ten per cent of households in cities under 30,000 and 40 per cent of rural non-farm households have gardens.^{1/}

Table 1 indicates the trends in acreage, yield, total production, average price, and total value of potato production in Alberta for the period 1931 to 1951. The acreage of potatoes decreased from 32,000 acres in the period 1931-35 to 25,000 acres in the period 1946-51. At the same time there was an upward trend in yields from 65 cwt. per acre in the 1931-35 period to 79 cwt. per acre in the 1946-51 period. The upward trend in yield offset the downward trend in acreage, with the result that the total output remained approximately constant, being about 2.1 million cwt. in the 1931-35 period and 2.0 million cwt. in the 1946-51 period. The average price per cwt. of potatoes has shown a sharply upward trend. For the period 1931-35 the average price was 64 cents a cwt., while in the period 1946-51 the price had risen to \$2.22 per cwt. With an approximately constant output and a much increased price, the total value of output rose from an average of \$1.3 million in the 1931-35 period to an average of \$4.3 million in the 1946-51 period.

Table 1.- Acreage, Yield, Output, Price and Value of Potatoes in Alberta, by Periods, 1931 to 1951

Period	: Acres	: Yield : per : acre	: Total : output	: Average : price : a/ : per cwt.	: Total value
	- 1000	- - cwt.	- - million cwt.	- - dollars	- - million dollars -
1931-35	32	65	2.1	.64	1.3
1936-40	28	69	2.0	.93	1.7
1941-45	28	73	2.1	1.50	3.0
1946-51	25	79	2.0	2.22	4.3

a/ Average wholesale price, first six months of the crop year.

Source: Dominion Bureau of Statistics, Monthly and Quarterly Bulletins of Agricultural Statistics, 1931 to 1952 inclusive.

Together with the decline of total acreage (Tables 1 and 2) in the period from 1931 to 1951, there also was a gradual shift of potato acreage between the more important areas of production within the province. Census Division 3, which includes the irrigation centres of Brooks and Vauxhall (Figure 1), showed an increase in potato acreage in the interval from 1931 to 1951; this area had a total of 1,200 acres in potatoes in 1931 while in 1951 this acreage had increased to 3,100 acres. Census Divisions 2, 6, 8, and 11 showed a decline in acreage during the same time interval; Census Division 2 showed a decline from 6,670 to 1,700 acres, this decline occurring despite the inclusion of irrigation lands in the vicinity of Lethbridge. Similarly Census Divisions 6, 8, and 11 declined from 3,100, 2,500 and 7,000 acres in 1931 to 900, 1,200 and 3,200 acres respectively

^{1/} The Combined Food Board. Food Consumption Levels in Canada, the United Kingdom and the United States. Queen's Printer, Ottawa. p. 97. 1944.

in 1951. The remaining Divisions considered together declined from 15,730 to 7,600 acres, while all Divisions considered together declined from 36,200 to 17,700 acres.^{1/}

Table 2.- Potato Acreage by Census Divisions, 1931 and 1951

Census Division	Census year	
	1931	1951
- acres -		
2	6,670	1,700
3	1,200	3,100
6	3,050	900
8	2,520	1,200
11	7,030	3,200
Other divisions	15,730	7,600
All divisions	36,200	17,700

Source: 7th and 9th Censuses of Canada, 1931 and 1951.

Types of Producers

Potato production in Alberta may be classified according to three types of growers, namely: (1) non-commercial, (2) certified seed and (3) commercial growers.

Non-Commercial Producers.— The non-commercial category includes urban and rural growers who produce mainly for purposes of family consumption. The acreage grown by the non-commercial producers is largely confined to the garden area and is relatively stable from year to year. In favourable years production may exceed family requirements; in this instance the surplus may be disposed of through local markets or, in the case of the farm family, by feeding to livestock.^{2/} The greater majority of the potato producers may be classified in this category. No accurate estimate of their numbers is possible as no information is available on the numbers of urban non-commercial producers. Information is available, however, on the numbers of rural non-commercial producers. In the 1951 Census there were 46,000 farms in the province reporting some potato acreage. If an allowance is made for approximately 1,000 producers of certified seed and commercial potatoes,^{3/} about 45,000 or 98 per cent of

^{1/} The actual changes in acreage in the interval from 1931 to 1951 were likely somewhat different from those indicated in Table 2, due to the revised definition of the farm in the 1951 Census. It is likely, however, that the actual changes in acreage differed only in degree and not in direction from the changes indicated in Table 2. For a definition of the farm in the 1951 and 1941 Censuses see: Dominion Bureau of Statistics, Ninth Census of Canada, 1951, Special Compilation S.A.-1., March 18, 1952, p. 1. The definition of the farm in the 1941 and 1931 Censuses was the same.

^{2/} The suitability of potatoes as a livestock feed is indicated in: Potatoes for Livestock. Publication No. 818, Circular No. 179. Department of Agriculture. Ottawa.

^{3/} In 1951 there were 824 producers of certified seed and commercial potatoes (see Tables 3 and 5.).

the total growers were non-commercial producers. The total of 46,000 producers grew about 18,000 acres of potatoes.^{1/} Allowing approximately 8,000 acres ^{2/} for certified seed and commercial potato production, the 45,000 non-commercial growers produced potatoes on plots of land considerably below one acre in size.

Certified Seed Producers.- The second category includes the growers of certified seed potatoes. These growers produce seed chiefly for the commercial growers and to some extent for the rural and urban non-commercial producers. The requirements for the production of certified seed potatoes are (1) that the grower plant only certified seed potato stock on his farm, (2) that he follow practices which eliminate the presence of disease, (3) that his fields pass the inspection for freedom of disease and purity of variety, and (4) that the tubers be graded according to seed potato standards before being offered for sale.^{3/} The majority of the certified seed potato growers sell their seed stock through table stock channels. The amount sold in this way depends on the export and domestic demand for seed.

The acreage and number of growers of certified seed potatoes in Alberta since 1945 are shown in Table 3. There was an erratic upward trend in the acreage of certified potatoes from 371 acres in 1945 to 727 acres in 1951. With no trend in the numbers of certified seed growers, the acreage of seed potatoes per grower has shown an upward trend from 4.2 acres in 1945 to 7.3 acres in 1951.

Table 3.- Acreage and Number of Growers of Certified Seed Potatoes in Alberta, 1945 to 1951

Year	Acres	Growers - number -	Acres per grower
1945	371	115	4.2
1946	592	159	4.7
1947	550	119	4.6
1948	534	95	5.6
1949	804	96	8.4
1950	1,139	156	7.3
1951	727	99	7.3
1945-51 Average	678	120	6.0

Source: Compiled from a list of crops passing inspection by the Dominion Seed Certification Branch of the Plant Protection Division.

^{1/} Ninth Census of Canada, 1951. Also see Table 2.

^{2/} In 1951 certified seed and commercial potato acreage amounted to 8,143 acres (see Tables 3 and 4).

^{3/} The Destructive Insect and Pest Act and Regulations Thereunder, Department of Agriculture, Science Service, Division of Plant Protection. Ottawa, 1949. pp. 26-33.

The relative importance of individual areas is indicated by figures for the acreage and numbers of certified seed growers for 1951, the only year for which this information is available for all areas. In that year the Lethbridge, Lacombe, and Brooks areas, with 237, 144 and 78 acres of seed potatoes respectively, were the three most important seed producing areas in the province; the Edmonton, Vauxhall, and Hillspring areas with 66, 65 and 64 acres respectively were about equal and next in importance to the first three as seed producing areas; the remaining area of 73 acres of seed potatoes was distributed between the Peers and Calgary areas.

Commercial Producers. - The third category includes the growers of commercial potatoes who produce primarily for the consumer markets, and in addition small amounts for the needs of their families. The majority of the commercial potatoes are grown within the boundaries of the Pest Control Areas ^{1/} (Figure 1). All commercial potatoes produced within these areas are subject to inspection and potato stocks found to contain Bacterial Ring Rot are allowed to be sold only through designated channels under provincial supervision. Some commercial potato production occurs outside of the Pest Control Areas; however, these growers are limited in numbers as they must rely on local markets for the disposal of their crop.

Four major commercial producing areas may be identified, namely the Calgary, Edmonton, Lethbridge and Brooks areas. The Lethbridge area includes parts of Census Divisions 1, 2 and 3 (Figure 1), the Edmonton area part of Census Division 11, the Brooks area is a part of Census Division 4, and the Calgary area a part of Census Division 6; the commercial potato production in the vicinity of the city of Drumheller is included in the Calgary area. Table 4 indicates the distribution of potato acreage between the four areas, and the trend in acreage in each. On the basis of averages for all available years, the Lethbridge area, with 4,690 acres, was the most important area of commercial potato production in the province. It was followed in importance by the Edmonton and Brooks areas which had 2,160 and 1,950 acres respectively; the Calgary area was least in importance, having an area of only 370 acres.

For the periods under consideration in each area, potato acreage was characterized by a downward trend in the Calgary area and by no apparent trend in any of the remaining areas. The potato acreage of commercial producers was characterized further by a high degree of year-to-year variability. This is particularly noticeable in the Brooks area where the 3,420 acres in 1946 was more than double the acreage of 1,540 in 1945. Similarly in 1950 the acreage of 2,520 was about 1,000 acres higher than the acreage of 1,500 in 1949; in 1951 the acreage had again decreased to 1,480 acres. The year-to-year variability is somewhat less in the other areas; however, all the areas experienced a severe decline in acreage in 1951 in comparison with 1950.

^{1/} For a definition of the boundaries of the Pest Control Areas see: Government of the Province of Alberta, Department of Agriculture. The Agricultural Pests Act, Chapter 76, R.S.A. 1942. Order-in-Council No. 278-50. See also Figure 1.

Table 4.- Acreage of Commercial Potatoes by Areas, 1945-51

Year	Calgary	Edmonton	Lethbridge	Brooks
- acres -				
1945	a/	a/	a/	1,540
1946	a/	a/	a/	3,420
1947	530	2,130	a/	1,940
1948	440	2,380	3,810	1,280
1949	260	2,010	4,230	1,500
1950	380	2,370	6,950	2,520
1951	230	1,930	3,780	1,480
Average	370	2,160	4,690	1,950

a/ Information not available.

Source: Crops Branch, Alberta Department of Agriculture.

The number of commercial producers is indicated in Table 5. For the short period under consideration there was a downward trend in the numbers of producers in the Calgary, Lethbridge and Brooks areas; however, in the Edmonton area, the number of producers was approximately constant. The number of producers has varied in the same direction as the acreage (Table 4) suggesting that the response of production to price may occur by the exit from, or entry into the potato industry, of producers as prices decrease, or increase, respectively.

Table 5.- Number of Commercial Potato Producers by Areas, 1945 to 1951

Year	Calgary	Edmonton	Lethbridge	Brooks
- number -				
1945	a/	a/	a/	257
1946	a/	a/	a/	419
1947	220	248	a/	210
1948	137	340	590	142
1949	92	214	430	142
1950	132	220	521	182
1951	108	221	302	94

a/ Information not available.

Source: Crops Branch, Alberta Department of Agriculture.

The acreage per enterprise in the Edmonton and Calgary areas has remained approximately constant (Table 6); in the former area this is the result of a constant total acreage (Table 4) and a constant number of growers (Table 5); in the latter area a decline in the total acreage has been approximately matched by a decline in the total number of growers, causing no apparent change in the acreage of the potato enterprise. In the Lethbridge and Brooks areas (Table 6), the increased acreage in the

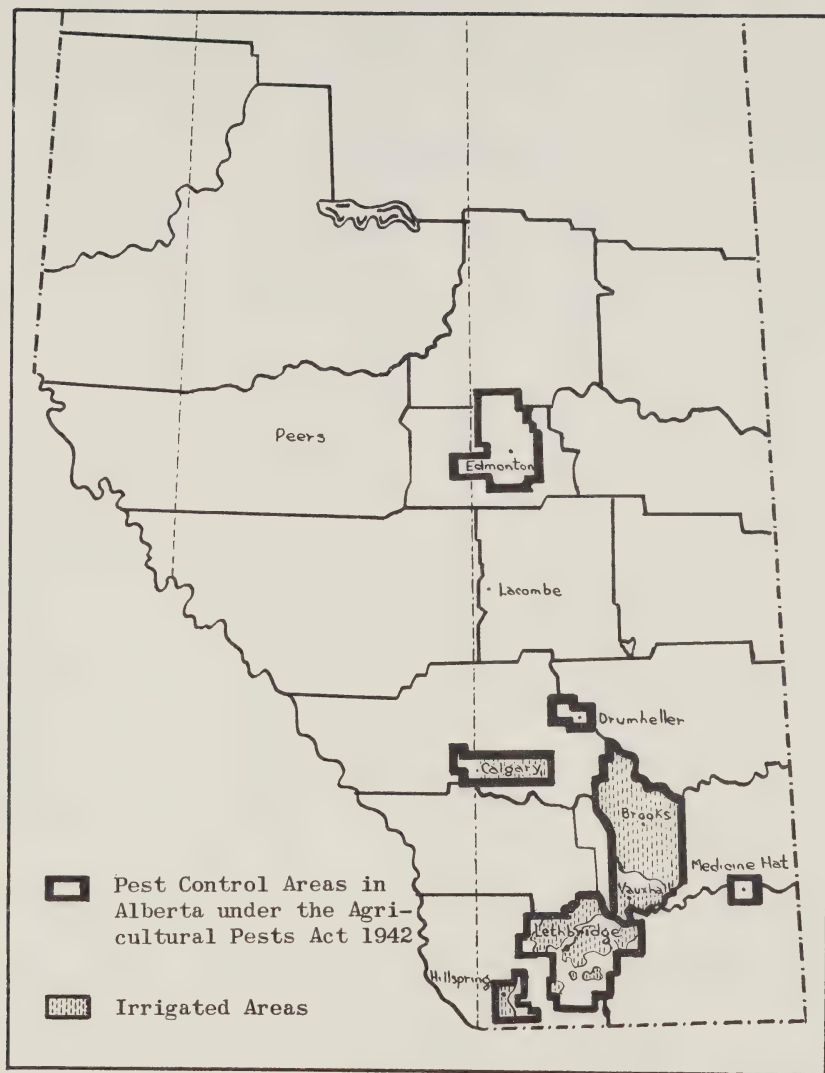


Figure 1.- Principal commercial potato producing areas and pest control areas in Alberta.

potato enterprise is the result of a constant total acreage of potatoes (Table 4) and a declining trend in the number of growers (Table 5).

Table 6.- Average Size of Commercial Potato Enterprise by Areas, and by Years

Year	Calgary	Edmonton	Lethbridge	Brooks
- acres per grower -				
1945	a/	a/	a/	6.0
1946	a/	a/	a/	8.2
1947	2.4	8.6	a/	9.2
1948	3.2	7.0	6.5	9.0
1949	2.9	9.4	9.8	10.6
1950	2.9	10.8	13.3	13.8
1951	2.1	8.7	12.5	15.7
Average	2.7	8.9	10.5	10.4

a/ Information not available.

Source: From Tables 4 and 5.

The commercial producers on the irrigated lands at Lethbridge and Brooks had an average of 10.5 and 10.4 acres in their potato enterprise respectively; producers at Edmonton had an average of 8.9 acres, while producers at Calgary had an average of only 2.7 acres in their potato enterprise (Table 6). The high acreage per grower in the Edmonton, Lethbridge and Brooks areas is caused by a high proportion of growers, namely 15, 22 and 25 per cent respectively, in the large enterprise class (Table 7), and a corresponding moderate proportion of growers, namely 57, 52 and 45 per cent respectively in the small enterprise class. The low average acreage of potatoes per enterprise in the Calgary area is the result of a low proportion, three per cent, of large producers and a high proportion, 85 per cent, of small producers.

Table 7.- Proportion of Growers in Various Sizes of Enterprise by Areas

Area	Small Under 5 acres	Medium 5 to 39 acres	Large 40 acres and over
- per cent -			
Calgary	85	12	3
Edmonton	57	28	15
Lethbridge	52	26	22
Brooks	45	30	25

a/ The percentages in the table are average proportions of farms in the three size classes for the following years: Calgary 1947-51, Edmonton 1947-51, Lethbridge 1949-51 and Brooks 1945-51.

Source: Crops Branch, Alberta Department of Agriculture.

RELATIVE IMPORTANCE OF POTATOES

The relative importance of potato production in relation to other specialty crops and in relation to the main crop of wheat is indicated by a comparison of the relevant acreages and output figures for the six-year period 1946-51 inclusive (Table 8). On the basis of acreage, the total area of 69,000 acres devoted to the production of the specialty crops of sugar beets, potatoes, and peas, formed only about one per cent of the area of 6,900,000 acres devoted to wheat. A somewhat different degree of importance of these specialty crops is indicated by a comparison of value figures. The total value of the three specialty crops was 10.4 million dollars or about six per cent of the total value of wheat output. The latter comparison indicates the greater per acre value of specialty crop production in comparison with wheat. The relative importance of potato to sugar beet production is approximately the same from both the acreage and value comparisons. The area of 25,000 acres in potatoes was about 80 per cent of the area of 32,000 acres in sugar beets; similarly the value of potato production of \$4.4 million was about 80 per cent of the value of \$5.5 million of sugar beet production. These comparisons indicate the somewhat greater importance of sugar beets in comparison with potatoes as a specialty crop in Alberta.

Table 8.- Gross Value and Acreage of Selected Field Crops in Alberta, 1946-51 Period

Crop	Area	Gross value
	- 1,000 acres -	- 1,000 dollars -
Sugar beets	32	5,500
Potatoes	25	4,400
Peas	12	500
Wheat	6,900	182,300

Source: Dominion Bureau of Statistics, Quarterly Bulletin of Agricultural Statistics, 1946 to 1951 inclusive.

In the irrigation areas, the rotation, soil, climatic, labour, and machinery requirements are approximately similar for both the sugar beet and potato enterprises. Sugar beet production is, however, usually given first choice of the land both because of (1) the probable higher net income return per acre in the long-run, and (2) the lesser uncertainty associated with its production. In sugar beet production, uncertainty to the farmers is kept at a minimum because sugar refineries contract for acreage every year. On the other hand, wholesalers do not contract for potato acreage with potato producers; the entire burden of price uncertainty is therefore placed on the potato grower.

In the market garden areas outside of the irrigation districts, sugar beet production is not an alternative to potato production. The alternative

possibilities in these areas include other vegetable crops and wheat production. Despite the probable greater uncertainty associated with potato production in comparison with the indicated alternatives, potato production is undertaken on the basis of the more favourable returns which usually accrue to the growers.

COMMERCIAL PRODUCTION OF POTATOES

One of the purposes of this study is to describe and analyze the types of farm organization which have become established as a result of the changed conditions of production and demand.^{1/} To meet this purpose, a farm survey was conducted during the summer of 1950 and information was obtained pertaining to the farm operations for the crop year of 1949.^{2/} The questionnaire was designed to gather information on farm organization and the cultural and marketing practices of commercial potato producers. In respect to farm organization, farmers were questioned on the sizes of their potato enterprises, and the kinds and sizes of other enterprises on their farms. They were also questioned in respect to changes in size, the tenure arrangements, and capital and storage requirements for their potato enterprise. In respect to cultural practices, farmers were questioned on their planting practices, insecticide and seed treatment requirements, the varieties planted and fertilizer used, and their yield levels obtained. Marketing information was given by farmers with respect to the storing, grading, and bagging services that are performed on the farm, and the quality of the potatoes marketed.

The required information was obtained from 88 farmers who produced a total of 2,112 acres of potatoes in 1949; of this acreage, 1,752 acres were in the irrigation areas. The growers were selected from five of the commercial producing areas of the province; 33 farmers were interviewed in the Brooks area, 25 in the Lethbridge, 15 in the Edmonton, 12 in the Vauxhall, and three in the Medicine Hat area. The Brooks and Vauxhall areas include potato growers in the Eastern and Canada Land and Irrigation Districts, respectively; the Lethbridge area refers to the Lethbridge Northern, Alberta Railway and the Taber, McGrath, Raymond and United Irrigation Districts; the Edmonton and Medicine Hat districts refer to areas within ten miles from the respective city centre. These areas are the same as the commercial producing areas indicated previously (p. 5) except that the Calgary area has been excluded, and the Medicine Hat and Vauxhall areas have been separated from the Lethbridge area.

Each of the areas is characterized by some distinctive feature. Dry-land potato production occurs only in the Edmonton area; the Brooks and Vauxhall areas have a high proportion of light and medium textured soils, making these areas particularly favourable to potato production.

^{1/} See pp. 1-2 for an indication of the changed conditions.

^{2/} The 1949 crop year is taken to extend from the date of fall tillage in 1948 to the harvesting of the crop in 1949 and the final disposition of the crop in June 1950.

The Lethbridge area has a high proportion of heavy soils, and is less favourable to potato production than the former two areas; the Medicine Hat area is characterized by having local irrigation works.

Sampling Procedure

To obtain a sample of commercial potato growers for interview purposes, lists of all growers holding provincial disease control permits in 1949 for five or more acres of potatoes were obtained from the Field Crops Branch of the Alberta Department of Agriculture. In four of the districts, namely Lethbridge, Brooks, Edmonton, and Medicine Hat, every third farmer was chosen for interview purposes. Since the number of required farmers in the Vauxhall district was small, an effort was made to obtain all such farmers. Growers with less than five acres were excluded as their acreage was considered too small to provide useful information on farm organization. Fifteen producers' records were obtained in the Edmonton area, 12 in the Vauxhall and three in the Medicine Hat area. A larger number of producers were obtained in the Lethbridge and Brooks areas, 25 and 33 respectively.

Farm Organization

Rotations.- A rotation of crops is a necessity in the successful production of commercial potatoes. The most important consideration in a suitable rotation is disease control; this requires that potatoes be planted on fresh ground as frequently as possible, preferably every year. A good rotation also should maintain a desirable tilth and structure of the soil to facilitate the planting, cultivation, and digging of the tubers. Since potato production does not usually represent the major enterprise of the farm, a suitable potato rotation also must be adapted to the rotational requirements of the major enterprises on the farm.

Several types of rotations are possible on irrigation farms. Where irrigated production is combined with dryland farming, two rotations are required, one suited to dryland and the other to irrigated conditions. On many irrigation farms, wheat, coarse grains (some of which are sown as a cover crop for legumes), legumes, and some summer-fallow acreage comprise the basic rotation. If potatoes are grown, the part of the legume land which is to be devoted to the potato crop is broken up after the first cutting of the hay crop in the second year; in the third year, the area may be planted to potatoes, sugar beets or canning crops; where potatoes are grown in the fourth year they may be followed by sugar beets in the fifth year. After this the land devoted to specialty crops usually reverts to grain and legumes.

The rotational practices of producers in the irrigated areas (Table 9) are in general close to those indicated above. In the Lethbridge area potatoes were combined with grains, forage crops, sugar beets, canning crops, and fallow. In the Vauxhall and Brooks areas potatoes were combined with the same crops as in the Lethbridge

area except that sugar beets were excluded; in the Medicine Hat area potatoes were combined with canning crops, the sugar beets, grain, forage, and summerfallow enterprises being excluded. In three of the four irrigated areas the grain acreage was the largest in the Brooks, Lethbridge and Vauxhall areas, averaging 65, 48 and 28 acres respectively.

Table 9.- Acres Cultivated per Farm, Acreage in Potatoes and Acreage in Other Crops, for 88 Farms, by Areas, 1949

Area	:Cultivated: : area	: :Potatoes	: :Grains	: :Forage	:Sugar: :Beets	:Canning: :crops	: :Fallow	: :Other - average acres per farm -
Lethbridge	157	19	48	9	12	5	14	50
Vauxhall	186	30	28	4	-	8	6	76
Brooks	218	24	65	25	-	4	10	90
Medicine Hat	70	29	-	-	-	23 ^{b/}	-	18
Edmonton	150	25	84	4	-	-	27	10
All irrigation	186	24	50	15	4	6	11	76
All areas	180	24	56	14	3	5	13	65

a/ The column marked "Other" is a residual column, in which the acreage not otherwise classified is included.

b/ Vegetable crops rather than canning crops were grown in the Medicine Hat area.

The potato enterprise in the Lethbridge area, averaging 19 acres, was second to grain in terms of acreage. In the Brooks area where the potato acreage averaged 24 acres it occupied third place, grain crops and forage crops representing first and second places respectively. In the Vauxhall and Medicine Hat areas, the potato enterprise with 30 and 29 acres respectively was first and the grain and canning crop enterprises with eight and 20 acres respectively were second largest in acreage requirements. The differences in size of the potato enterprise may be attributed largely to soils and the competitive position of sugar beets; the Lethbridge area contains a large proportion of heavy soils which are not very favourable for potato production, while the remaining three irrigation areas contain soils which are more favourable to potato production.

In the dryland areas suitable for commercial potato production the typical rotation is grain, grain, summerfallow, with some legume being introduced occasionally to replace a portion of the summerfallow. Potato production may be adapted to this rotation by using either the legume area or a portion of the summerfallow area for potatoes. The rotational practices of the farmers in the Edmonton area (Table 9) complied closely with the dryland rotation indicated above. For the 15 farmers interviewed, the potato enterprise, which averaged 25 acres in size, was combined with 84 acres of grain, four acres of forage, and 27 acres of summerfallow.

The limitations of the information contained in Table 9 should be indicated. Firstly, not all the farmers who grew crops other than potatoes reported the acreage of these crops; hence the average acreage shown for these crops will be somewhat lower than the actual. Secondly, rotations on individual farms varied somewhat from the average rotation 1/ indicated in Table 9. This is due to specialized potato producers as well as those who grew fewer kinds of crops than the average grower in an area.

Change in Size of the Potato Enterprise.- Growers were asked to indicate the changes in size made in their potato enterprise in the last ten years, 2/ and the reasons for these changes. Of the total of 88 growers, 50 indicated an increase in acreage (Table 10) while 36 growers indicated no change or a decline in acreage, and two growers did not report.

Table 10.- Changes in Size of the Potato Enterprise from 1941 to 1950
and Reason for the Changes, for 88 farms,
All Areas

	Number of growers
Reasons for Increase in Acreage:	
Increased potato prices	14
No reason	13
More land	9
More machinery	4
As good as fallow	4
Other	<u>6</u>
Total	50
Reasons for No Change or Decline in Acreage:	
Limited to family labour	16
Other	13
No reason	<u>7</u>
Total	36
Non-reporting	2

The increased price of potatoes associated with the rising income level of the last ten years was indicated by 14 of the growers as the reason

1/ The variation in rotations which is possible on individual farms is indicated in: A Guide to Potato Production Under Irrigation in Alberta, Government of the Province of Alberta, Field Crops Branch, Edmonton, 1950, p.1.

2/ The average length of commercial potato production per grower was 18 years in the Edmonton and Vauxhall areas, and 13, seven, and two years in the Lethbridge, Brooks, and Medicine Hat areas respectively. The projection backward of a ten-year period in all these areas will include the expansion of the potato enterprise under varying stages of maturation of potato production.

for the expansion of the enterprise. Other reasons for expansion of the potato enterprise were: (1) the availability of more land and machinery, indicated by 13 of the growers, and (2) the fact that potatoes are considered equivalent to summerfallow for purposes of moisture conservation and weed control, indicated by four of the growers. Of the 36 growers who reported no change or a decline in acreage, lack of sufficient labour supply was listed by 16 of the growers as the reason for not expanding the potato acreage. With the rising price level for potatoes in the last ten years the inability of some growers to obtain the necessary capital for labour and other expenditures suggests the presence of capital rationing on these farms.

In addition to the long term changes in the potato enterprise, growers were asked to indicate the change in acreage in 1950 in relation to the acreage in 1949. Of the total of 88 growers, 28 reported that they had not changed their potato acreage in the past year (Table 11); 52 growers reported an average increase of 22 acres and eight growers reported an average decrease of four acres. Allowing for the decreased acreage on the part of some farmers, there was a net increase in the size of the potato enterprise for the growers in all areas by 12 acres; an increase in the average size of the potato enterprise from 24 acres in 1949 (Table 9) to 36 acres in 1950. The large expansion in the acreage of commercial potatoes in the year 1950 was attributed by the growers as being due to high prices of potatoes in the fall of 1949 and spring of 1950. Such a response on the part of the farmer supports the theory that a cycle 1/ exists in output and prices of commercial potatoes.

Table 11.- Change in Potato Acreage from 1949 to 1950,
for 88 Farms, by Areas

Area	:Average increase:					
	: in acreage for :			: Decrease :		
	:all growers from :			: growers :		
	: 1949 to 1950	: growers:	: Acres per:	: growers:	: Acres per:	: growers
Lethbridge	6	15	11	4	4	6
Vauxhall	40	9	54	1	4	2
Brooks	11	20	17	1	1	12
Medicine Hat	18	3	18	-	-	-
Edmonton	4	5	14	2	4	8
Irrigated areas	15	47	22	6	4	20
All areas	12	52	22	8	4	28

Soil Types. - Potato production is most adaptable to medium and light textured soils. The tubers grown in these soils are more uniform in size; the greater aeration results in better drainage and less disease. It is

1/ Agricultural Price Analysis, G.S. Shepherd, The Iowa State College Press, Third Edition, 1950; pp.32-49.

also possible to operate machinery more cheaply in light than in heavy textured soils; this facilitates planting, tillage between rows during the summer, as well as the harvesting of the crop. In the Vauxhall area, about 42 per cent of the soil is classified as light textured; in the Brooks area the proportion of light soil is reduced to about 30 per cent. At Taber, one of the sub-sections of the Lethbridge area, only about 17 per cent of the soil is light textured, while in the remaining sub-sections of the Lethbridge area for which information is available there is no soil which is classified as light textured. No similar information is available for the Edmonton or Medicine Hat area.^{1/}

Table 12.- Classification of Soil Texture by Growers,
and Potato Acreage per Grower by Soil Texture,
for 88 Farms, by Areas, 1949

Area	Soil texture					
	Light		Medium		Heavy	
	Fine sand to sandy loam		Silt and silt loam		Clay loam to clay	
	No. of	Acres per	No. of	Acres per	No. of	Acres per
	Producers	Producer	Producers	Producer	Producers	Producer
Lethbridge ^{a/}	4	30	8	14	11	15
Vauxhall	4	44	5	33	3	6
Brooks	24	26	3	36	6	18
Medicine Hat	1	12	1	60	1	15
Edmonton	9	30	6	17	-	-
All areas	42	28	23	24	21	13

^{a/} There were 25 growers in the Lethbridge area, but only 23 of these reported the soil texture on their potato acreage.

Each potato grower was asked to describe the prevailing texture of the soil of the area on which he grew potatoes. Table 12 indicates that growers tended to confine their acreage of potatoes to the light and medium textured soils. In the Edmonton area nine producers indicated they grew potatoes on the light and six on the medium soil. In the Lethbridge, Brooks, and Vauxhall areas, out of a total of 23, 33 and 12 growers reporting, 12, 27 and nine growers respectively reported growing their potatoes on the light and medium textured soils. Of the three producers in the Medicine Hat area, there was one grower in each of the three soil types. In addition to having the larger proportion of growers, the light and medium textured soils were also conducive to the existence of the larger potato enterprises. In Table 12, for all areas, the average size of the potato enterprise on light soils was 28 acres, while in the medium and heavy soil classes it was 24 and 13 acres respectively. Excluding the Medicine Hat area, this relationship appeared to be true.

^{1/} Farming in the Irrigation Districts of Alberta, C.C. Spence, B.H. Kristjanson, and J.L. Anderson, Marketing Service, Economics Division, Department of Agriculture, Ottawa, Publication No. 793, Technical Bulletin No. 61, November, 1947; p. 16. Light textured soils include fine sandy loam, sandy loam and fine sand.

for all the areas except Lethbridge; in the latter, the potato enterprise on the light soil was the largest, or 30 acres in size; however, the potato enterprise on the heavy soil was 15 acres and in the medium soils, only 14 acres in size.

Land Tenure.- Table 13 indicates the type of tenure arrangements under which potato producers held their entire land area. Ownership of the land area by the operator was the most popular; eight of the 15 growers in the Edmonton area and 53 of the 73 growers in the irrigated areas were land owners. Where the land area was rented, cash renting was the most popular arrangement; seven farmers in the Edmonton area and 12 farmers in the irrigation areas held their land area in this manner. Share renting was much less common, only five farmers having such arrangements in the four irrigation areas and none in the Edmonton area. For the five farmers in the Edmonton area who owned some and cash rented the remainder of their land area, no information is available on the rental arrangement for their potato and non-potato enterprises. Where the farmer was both a renter and an owner, it could be postulated, however, that he would likely confine his potato acreage to the owned portion of his farm; the short duration of many rental agreements provides too great a degree of uncertainty for the farmer to undertake a desirable potato rotation. This consideration may be overcome if the soil on the rented land were especially suitable for potato production or if some means were taken to remove the uncertainty associated with the rental arrangement.

Table 13.- Tenure of 88 Farms, by Areas, 1949

Area	Owners	Renters		Other Arrangements
		Cash	Share	
- number -				
Lethbridge	17	5	2	1
Vauxhall	7	2	3	-
Brooks	29	3	-	1
Medicine Hat	-	2	-	1
Edmonton	8	7 a/	-	-
All areas	61	19	5	3

a/ Five of the seven are part owners.

Machinery and Labour Requirements.- Machinery may be substituted for labour; in other words a given operation may be performed with less labour and more machinery. Other advances in mechanization use the same amount of labour and more machinery and create an increased output. Mechanical planters have largely substituted machinery for labour; similarly the introduction of inter-row tillage machinery reduced the requirements for labour and increased those for machinery. Mechanical diggers generally resulted in the use of an increased amount of machinery with about the same or only a slightly reduced amount of labour, and the combining of the digging, picking, bagging, and hauling operations. There is an increase

in efficiency as the combination of the operations results in a saving of time; there is a further increase in efficiency as a result of the better timing which is possible when operations are combined. There are still important operations in potato production which have not been affected by mechanization and require a great deal of hand labour. These are (1) culling and treating the tubers prior to planting, (2) hoeing in the rows for weed control, (3) gravity irrigation, and in many cases (4) sorting, grading, bagging, and weighing the potatoes for market.

The present extent of mechanization on the surveyed potato farms is indicated by the value of the special potato equipment which growers possess (Table 14). The average value of special equipment per farm was about equal, being \$1,070 in the Edmonton and \$1,100 in the irrigation areas. However, the value of all equipment in the Edmonton area, \$4,430, was lower than the corresponding value of \$8,080 in the irrigation areas. As a result, in the Edmonton area about 24 per cent, and in the irrigation areas about 14 per cent of the total machinery investment was for specialized potato equipment. In the irrigation areas, the ratio of specialized to general equipment ranged from a low of 11 per cent in the Lethbridge area to a high of 19 per cent in the Medicine Hat area.

Table 14.- Value of Specialized Potato Machinery and Total Machinery per Farm, for 88 Farms, by Areas, 1950

Area	Value of Specialized equipment per farm ^{a/}	Value of all: equipment per farm	Ratio of specialized to total equipment
	- dollars -		- per cent -
Lethbridge	880	7,680	11
Vauxhall	1,350	9,920	14
Brooks	1,170	7,910	15
Medicine Hat	1,110	5,850	19
Edmonton	1,070	4,430	24
All irrigation	1,100	8,080	14
All areas	1,090	7,460	15

^{a/} Includes the values of planters, diggers, fertilizers and fertilizer attachments, and sprayers or dusters, and other specialty equipment as indicated in Table 15.

The types and numbers of specialized potato machinery on farms are indicated in Table 15. Out of the total of 88 farmers in all areas, 79 farmers had planters and the group owned 91 diggers; this averages into something less than one planter and more than one digger per grower. Other specialty equipment was somewhat less common; 30 farmers owned either a duster or a sprayer, 36 farmers owned either a fertilizer machine or a fertilizer attachment for their planters, and 31 farmers possessed other special potato equipment such as conveyors, graders, or pickers.

Table 15.- Specialized Potato Machinery on 88 Farms, by Areas, 1950

Area	:	:	:	:	:
	a/	a/	or	or fertilizer :	b/
	Planters	Diggers	Sprayers	attachments	Other
- number -					
Lethbridge	22	25	15	9	5
Vauxhall	12	12	6	10	4
Brooks	29	36	6	9	15
Medicine Hat	2	3	-	1	1
Edmonton	14	15	3	6	6
Total	79	91	30	35	31

a/ Includes planters and diggers which are one, two, or more rows in size.

b/ Includes conveyors, graders, and pickers.

Farmers also utilize a part of their general equipment for the potato enterprise. Thus the tractor, irrigation equipment, tillage machinery, and truck and trailers are used in conjunction with the specialty equipment or separately to perform the necessary operations on the potato enterprise. In addition to the specialized and general machinery, farmers also utilize a large amount of labour on their potato enterprise. In planting, inter-row tillage, digging and hauling, some labour must be combined with the machines which perform these operations. In others, such as the preparation of seed for planting or the grading of the tubers, the operation is performed entirely by labour.

The various operations required in potato production as well as their corresponding machinery and labour requirements are given in Table 16. The total machinery use per acre was 25.4 hours in the irrigation areas and 14.8 hours in the Edmonton area. The lower machinery requirements in the Edmonton area were due primarily to the reduced tractor use (4.0 hours in comparison with 10.7 hours in the irrigation areas) as a result of the replacement of some tractor work by horse power; contributing factors to the lower machinery use in the Edmonton area were the lower requirement of machinery for (1) truck hauling and loadings (1.6 hours compared with 4.0 hours in the irrigation areas), and (2) digging, picking, and hauling (2.6 hours compared with 4.2 hours in the irrigation areas).

The total labour requirements in the Edmonton area were 48.3 hours; in the irrigated areas the corresponding labour requirements were somewhat more than double, or 106.4 hours per acre. The greater labour requirements in the irrigation in comparison with the dryland areas arise from the added labour requirements for irrigation, 9.7 hours, and a considerable increase in the labour for hoeing, from 2.4 to 11.0 hours. The total 71.4 hours of labour for digging, picking, bagging, grading, and hauling, is more than twice as much as the 34.8 hours required in the dryland areas; this increased labour requirement is associated with higher yields: the yield of 130 cwt. per acre on irrigated land was more than twice the yield of 50 cwt. on the dryland

areas (Table 17).

Table 16.- Labour and Implement Use on 88 Irrigated and Dryland Commercial Potato Farms, 1949

Sequence of operations	: Implement hours per acre :		: Hours labour per acre :	
	: 73 Irrigated :	: 15 Dryland :	: 73 Irrigated :	: 15 Dryland :
	farms	farms	farms	farms
Tractor	10.7	4.0 a/	b/	b/
Land preparation c/	2.1	1.9	2.1	1.9
Seed preparation d/	-	-	6.8	3.5
Planting	1.0	0.9	2.0	1.9
Tilling:				
Cultivation and spraying	3.4	3.8	3.4	3.8
Irrigation	-	-	9.7	-
Hoing	-	-	11.0	2.4
Harvest:				
Digging, picking & hauling	4.2	2.6	30.1	19.8
Grading and bagging	-	-	34.5	11.2
Truck hauling and loading	4.0	1.6	6.8	3.8
All operations	25.4	14.8	106.4	48.3

a/ In addition to the 4.0 hours of tractor use, 5.2 hours of horse use per acre was reported. This is not a complete recording of the horse hours as many of the implements required more than one horse on the drawbar.

b/ Labour to operate tractor included in labour requirements of the particular operation.

c/ Includes plowing, cultivating, levelling and harrowing.

d/ Includes selecting, cutting and treating the seed.

Table 17.- Yield of Potatoes, Hours of Labour and Implement Use on 88 Dryland and Irrigated Farms, 1949

Area	: No. of :	: Yield :	: Hours use per acre :		: Hours use per cwt. :	
			: farms :	: per acre :	: Labour :	: Implement :
			- cwt. -		- number -	
Edmonton	15	50	48.3	14.8	1.0	0.3
Irrigation areas	73	130	106.4	25.4	0.8	0.2

The machinery and labour requirements after an adjustment for yield are indicated in Table 17. The irrigation area required a total of 0.8 hours while the Edmonton area required 1.0 hours of labour per cwt. of potatoes. Similarly, the irrigation area required 0.2 hours and the Edmonton area 0.3 hours of implement use per cwt. This table serves to indicated the possible greater efficiency in the use of labour and machinery in the irrigated areas of the province for the year 1949. However, the

indicated labour and machinery efficiencies are not necessarily representative of the two areas in the long-run because (1) the yield in the Edmonton area was considerably below the average in 1949 (see page 27) and (2) the hours of horse use in the Edmonton area were excluded from the comparison.

Hired Labour Requirements.- Farmers utilize a portion of their own and their families' labour for the potato enterprise; for some of the operations, however, they must rely heavily on hired labour. Table 18 indicates the amount of labour that is hired for the various operations.

Table 18.- Hours of Hired Labour per Acre by Types of Operations on 88 Irrigated and Dryland Farms, 1949

Operations	: 73 irrigated farms: 15 dryland farms	
	- hours per acre -	
Land preparation	0.3	-
Seed preparation	2.1	-
Planting	0.2	-
Tillage:		
Cultivation and spraying	0.4	-
Irrigation	0.7	-
Hoeing	<u>2.9</u>	<u>-</u>
All tillage	4.0	-
Harvest:		
Digging, picking and hauling	12.9	15.5
Grading and bagging	8.9	-
Truck hauling and loading	<u>2.0</u>	<u>-</u>
All harvest	<u>23.8</u>	<u>15.5</u>
All hired labour	30.4	15.5
All labour (from Table 16)	106.4	48.3

The total hired labour of 30.4 hours in the irrigation area and 15.5 hours in the Edmonton area formed 29 and 32 per cent respectively of the total labour requirement of 106.4 and 48.3 hours in these two areas (Table 16). The highest hired labour requirement in the irrigation area was 12.9 and 8.9 hours for (1) digging, picking and hauling and (2) grading and bagging, respectively; these hired labour requirements formed about 43 and 26 per cent respectively of the total labour requirements for these operations of 30.1 and 34.5 hours (Table 16). In the Edmonton area all the hired labour reported by the growers was for the digging, picking and hauling of potatoes. The 15.5 hours of hired labour was about 78 per cent of the total requirement of 19.8 hours (Table 16) for these combined operations.

Farm Storage.- The common method of handling potatoes at harvest time is to pick them off the ground or off the digger and partially fill 100 pound jute bags. The potatoes are then hauled to root cellars and dumped in bulk for storage. Although this manner of treatment requires a larger amount of labour than if the potatoes were hauled to the root cellars in bulk, it is necessary in order to minimize the bruising of potatoes. When required by wholesalers, the potatoes are sorted and graded and packed into sacks for the market; usually this procedure is continued throughout the winter and completed the following spring.

The above practices are followed by growers who have root cellars on their farms. As indicated in Table 19, all growers interviewed had root cellars with the exception of those in the Brooks and Medicine Hat areas; in the former, only 20 out of the 33 and in the Medicine Hat area two out of three growers had root cellars. Those growers with no root cellars either sold their crop directly to wholesalers from the field, obtained storage in other buildings, or built temporary storage in the field and disposed of the crop early in the winter. Temporary storage facilities, when provided, consisted of piling potatoes in mounds on the field and covering them with straw and soil.

Table 19.- Growers with Storage, Farm Value and Capacity of Root Cellars, on 88 Farms, by Areas, 1949

Area	: Growers with : storage ^{a/} - number -	: Value - dollars -	: Capacity - tons -
Lethbridge	25	740	200
Vauxhall	12	780	230
Brooks	20	790	350
Medicine Hat	2	^{b/}	^{b/}
Edmonton	15	430	180
All irrigation	59	740	270
All areas	74	680	240

^{a/} One grower in the Lethbridge and two and three growers in the Vauxhall and Brooks areas had two root cellars each. In the Edmonton area one grower had two and another three root cellars.

^{b/} No value or capacity was reported by the two growers in the Medicine Hat area.

The typical root cellar was cheaply constructed: sufficient earth was excavated to form walls and a floor; roof construction consisted mostly of straw and dirt supported by timbers, iron rails, or poplar poles. The larger root cellars were constructed so as to permit the entrance of trucks; others were equipped with electric lights and electrically-powered grading machines. In the irrigation areas the average investment per farm in root cellars was about \$740, while in the Edmonton area the average investment was considerably less, or

about \$430 (Table 19). The greater capacity of the root cellars in the irrigation areas, 270 tons, and 180 tons in the Edmonton area, together with the probably cheaper supply of building material in the Edmonton area, are the possible reasons for the large difference in value of root cellars between the two areas.

Cultural Practices

Planting.- Recommended cultural practices at the time of planting include the following: (1) planting at a rate of about 1,000 pounds per acre of potatoes, (2) tubers should be 12 inches apart in the rows and 36 inches between rows, (3) certified seed should be acquired at least every third year as a precaution against disease, and (4) chemical treatment of the seed potato should be practiced in all years as a further precaution against diseases which may be present on the tubers or in the soil.

With some allowance for varying width of rows and for varying conditions on individual farms, growers planted approximately the recommended rate of 1,000 pounds per acre. The typical spacing of rows and sets within rows, about 38 by 15 inches, was also close to the recommended spacing. A few farmers in order to provide greater adaptation to their tillage machinery, spaced rows up to 44 inches apart; in this case the spacing of sets within rows was usually reduced to about 12 inches.

Commercial growers were aware of the importance of disease-free seed stock in the production of commercial potatoes (Table 20). Only five of the 88 growers interviewed indicated that they did not change seed regularly. The most common practice was to obtain certified seed every third year; this was done by 39 of the 88 growers. Seventeen growers obtained certified seed every two years and ten growers obtained certified seed every year. An additional 17 growers maintained a plot seeded to foundation stock potatoes as a source of their seed requirements.

Table 20.- Type of Seed Used on 88 Farms, by Areas, 1949

Area	No certified seed	Every year	Certified seed Every two years	Every three years	Seed plot	Total
	- number of growers -					
Lethbridge	-	-	3	17	5	25
Vauxhall	-	-	4	5	3	12
Brooks	1	6	10	11	5	33
Medicine Hat	-	3	-	-	-	3
Edmonton	4	1	-	6	4	15
All areas	5	10	17	39	17	88

Disease-free seed will not guarantee disease-free potatoes if some disease is preserved in the soil of the premises in which potatoes are kept. As a consequence, chemical treatment of seed tubers is a further precaution against disease which is taken by some farmers. In the main, however, it is a supplementary disease control measure practiced most commonly on farms changing seed infrequently or not at all. There are three types of chemical which may be used for the treatment of seed, 1/ namely (1) mercurial compounds, (2) non-mercurial compounds and (3) formaldehyde. Semason Bel and Spergon are trade names of two mercurial and non-mercurial compounds respectively that are being used; formaldehyde is also being used by some growers but is not recommended for general usage as it may harm the tuber.

In the Edmonton area, 20 per cent, or three out of the 15 growers, used a chemical treatment for their seed (Table 21), Semason Bel being used by two and Spergon by one of the growers. A much higher proportion of farmers, namely 44 per cent or 32 of the 73 growers in the irrigation areas, treated their seed chemically. The chemical treatment of seed was the most common in the Brooks, Lethbridge, and Vauxhall areas where 17, nine and six growers respectively adopted this practice; none of the growers in the Medicine Hat area treated their potato seed chemically.

Table 21.- Numbers of Growers Using Chemical Treatment of Seed, and Type of Chemical Used, on 88 Farms, by Areas, 1949

Area	Growers using chemicals					Proportion of potato acreage treated
	Total growers	Total	Spergon - number -	Semason Bel	Formal- dehyde	
Lethbridge	25	9	3	2	4	35
Vauxhall	12	6	4	2	-	26
Brooks	33	17	9	6	2	62
Medicine Hat	3	-	-	-	-	-
Edmonton	15	3	1	2	-	18
All irrigation	73	32	17	12	6	44

Spergon was the most common chemical applied in the irrigation areas, being used by 17 or 22 per cent of the 73 growers; in the same areas Semason Bel was used by 12 growers or 14 per cent, and formaldehyde by six growers or eight per cent of the 73 growers. Eighteen per cent of the total acreage was planted with chemically treated seed in the Edmonton area. The corresponding proportions were 62 per cent for the Brooks area, which was the highest of all the irrigation areas, and 44 per cent for all the irrigation areas considered together.

1/ A Guide to Potato Production Under Irrigation in Alberta, Government of the Province of Alberta, Field Crops Branch, 1950; p.6.

Insect Control.- The foliage of the potato plant is subject to attack by various pests and diseases if the climatic and other conditions are favourable to their development. The Colorado Beetle is the most common pest attacking potato foliage; in most years the beetle does not extend beyond the southern part of the province, but in years favourable to their development, infestation extends farther northward. There appeared to be no insect infestation in the Edmonton area in 1949 as indicated by the absence of spraying on any of the 15 farms (Table 22). Insect infestation was present in the irrigation areas where 48 farmers out of the 73 sprayed 1,080 acres or about two-thirds of the total potato acreage reported by these growers (page 9). The largest infestation appeared to be in the Lethbridge area where 23 out of 25 growers sprayed 428 acres. In the Vauxhall area nine growers out of 12 sprayed 252 acres, and in the Brooks area 15 out of 33 growers sprayed 388 acres. The largest proportion of growers, 30 out of 48, used D.D.T. as their insecticide; other insecticides were chlordane, lead arsenate, nicotine sulphate, as well as some whose chemical composition was unknown by the farmer because they were sold under a trade name.

Table 22.- Numbers of Growers Spraying Potatoes, Acreage Sprayed and Chemicals Used, on 88 Farms, by Areas, 1949

Area	Number of growers		Acres sprayed	Number of growers Using D.D.T.
	Total	Spraying		
Lethbridge	25	23 a/	482	17
Vauxhall	12	9	252	5
Brooks	33	15 a/	388	7
Medicine Hat	3	1	12	1
Edmonton	15	-	-	-
All areas	88	48	1,080	30

a/ One farmer in the Brooks area sprayed his potatoes three times; another in the Lethbridge area sprayed his potato acreage twice.

Varieties.- Potato varieties may be classified on the basis of season of maturity and also skin colour. With respect to maturity, early season varieties mature earlier than the late season varieties but require either an advance start in the spring or an advance in the harvest date to be ready for the early season market. The late season varieties comprise the bulk of the main crop; they are planted and harvested without any attempt to accelerate their rate of maturity. On the basis of skin colour, the tubers may be classified as being white, pink, or russet. The early varieties grown in Alberta, namely Irish Cobbler, Warba, Carters Early Favorite, and Bliss Triumph, are all white with the exception of Bliss Triumph which is pink-skinned. Of the important late varieties grown, the Netted Gem is russet-skinned.

The majority of growers concentrated on the production of late season potatoes. The only exceptions were in the Brooks and Medicine Hat

areas; in the former area one of the 33 growers specialized in the production of early potatoes and in the latter area only early potatoes were produced (Table 23). The Netted Gem was the most popular late variety and was grown exclusively in the Lethbridge and Vauxhall areas. In the Brooks area, while the Netted Gem was the predominant variety, there was a very small acreage devoted to other late varieties. Although some of these varieties outyielded the Netted Gem, farmers indicated a preference for the latter because of its desirable market and keeping qualities.

Table 23.- Growers, and Acreage of Late and Early Varieties of Potatoes, on 88 Farms, by Areas, 1949

Area	: Late varieties		: Early varieties	
	: Number of growers	: Acres per grower	: Number of growers	: Acres per grower
Lethbridge	25	16	13	4.5
Vauxhall	12	25	6	9.3
Brooks	32	21	15	9.4
Medicine Hat	-	-	3	29.0
Edmonton	15	19	13	6.5
All areas	84	20	50	8.6

Somewhat more than half, 50 out of the 84 growers of late potatoes, supplemented their acreage of late potatoes with a small acreage, about 8.6 acres per grower, of early potatoes (Table 23). The Irish Cobbler was the most popular early variety; it was grown exclusively in the Lethbridge, Vauxhall and Medicine Hat areas. In the Brooks area the Irish Cobbler was the predominant early variety but other varieties, the chief of which were Warba and Bliss Triumph, were also grown. In the Edmonton area Carters Early Favorite was almost the exclusive variety of early potatoes grown.

The combination of late and early varieties in the potato enterprise, although limited in extent, provides some advantages from both the production and marketing aspects. The combination of late and early varieties in production reduces the peak requirements for labour during the planting, tilling, and harvesting seasons. Early variety potatoes also help the farmer to take advantage of a favourable price relationship in the market. Potato prices begin to rise near the end of June and are highest in the months of July and August. In the latter part of July the Alberta early potatoes are ready for harvest; they are able to replace some of the imports and allow the farmer the advantage of the higher prices which prevail until the harvesting of the late potatoes in the latter part of September.

Use of Fertilizer.- The potato crop requires an abundant supply of plant food if high yields are to be obtained; as a consequence successful potato production usually requires some amount of fertilizing or manuring. In the irrigation areas producers applied only commercial fertilizers; in the Edmonton area both commercial

fertilizer and manures were applied. The application of fertilizer was heaviest in the Edmonton area (Table 24) with an average of 226 pounds per acre. The rate of application was approximately the same or 217 pounds per acre in the Medicine Hat area, but was considerably lower in the Lethbridge, Vauxhall, and Brooks areas, being 145, 124, and 144 pounds per acre respectively. The most common fertilizer in the irrigated and dryland areas was 11-48-0, ammonium phosphate.

Table 24.- Numbers of Growers and Rates of Application of Fertilizer, on 88 Farms, by Areas, 1949

Area	: Number of : : growers :	Rate of application per acre - pounds -
Lethbridge	20	145
Vauxhall	7	124
Brooks	22	144
Medicine Hat	3	217
Edmonton	5 a/	226

a/ Five growers in the Edmonton area also used manure at an average of 5.4 tons per acre.

In addition to increasing yields, fertilizers have some effect on the quality and date of maturity of the potatoes (Table 25). A total of 31 growers indicated that fertilizers increased yields; the average increase in yield was indicated to be about one ton per acre; 20 growers indicated that quality was improved by the use of fertilizer, chiefly by giving a larger and more uniform tuber; of these some indicated that the improved quality of the tuber was the result of an improvement in the taste.

Table 25.- Effect of Fertilizer Application on the Potato Crop, on 88 Farms, All Areas, 1949

Effect	: Number of growers
Yield increased	31
Quality improved	20
Mature earlier	13
No noticeable effect	8
Quality worsened	3
Mature later	2
All effects	77
No report	11

Thirteen growers indicated that the application of fertilizer caused the crop to mature earlier, while eight growers indicated no noticeable effect of the fertilizer. Three growers indicated a worsening of quality

attributable to the increased knobiness of the tubers, and two growers reported that the crop was later maturing. The increased knobiness of the tubers may be due to an uneven rate of development of the tubers which can be encouraged by fertilizer or by other factors.

Table 26 indicates the effect on the yields of late season potatoes in the irrigated areas of combining fertilizer with various types of rotation practices. Three farms with no commercial fertilizer or legume in their rotation had the lowest yields, namely 98 cwt. per acre. Twenty-two farms with commercial fertilizer but with no legume rotation had an average yield of 122 cwt. per acre. Farms with no commercial fertilizer, but with a legume in the rotation had average yields of 144 cwt. per acre; finally, the 29 farms with both fertilizer and a legume rotation had a yield of 156 cwt. per acre. While there are other factors such as soil texture, amount and distribution of the natural precipitation and supplemental moisture which influence yields, they are not considered in a comparison of this kind. Subject to this limitation, Table 26 indicates the possibility of increases in yields as a result of the use of fertilizer, an improved rotation, or from the use of both.

Table 26.- Comparative Yields of Late Potatoes, Under Various Rotation Practices, on 69 a/ Farms in the Irrigation Areas, 1949

Cropping practices	Number of farms	Average yield per acre of marketable potatoes - cwt. -
No commercial fertilizer or legume rotation used	3	98
Commercial fertilizer used but no legume rotation	22	122
No commercial fertilizer but legume included in rotation	15	144
Both commercial fertilizer and legume rotation used	29	156

a/ Three farms at Medicine Hat and one at Brooks excluded as they grew only early varieties.

Yield Levels.- The yield of potatoes in the various commercial areas of production is given in Table 27. In the Edmonton area where irrigation was not practiced, the average yield was 50 cwt. per acre. In the four irrigation areas the yields were considerably more favourable, ranging from a low of 96 cwt. per acre in the Medicine Hat area to 163 cwt. per acre in the Vauxhall area. The average yield for the four irrigated areas was 130 cwt. per acre; this represents an increase of 160 per cent in yields on irrigated as compared with dryland areas. This is an exceptionally favourable response in yields due to irrigation and

cannot be considered as representative of the typical response. The yield of 50 cwt. per acre in the Edmonton area is considerably below the provincial average of 72 cwt. ^{1/} per acre for the period 1931 to 1951; it is the result of extremely dry conditions during the growing season of 1949. A more modest, and likely a more representative increase in yields due to irrigation is obtained from another source.^{2/} The average yield for the four-year period 1944-1947 was 91 cwt. per acre on the irrigated, and 73 cwt. on the dryland areas. This represents an increase in yield of 25 per cent on irrigated in comparison with dry land.^{3/}

Table 27.- Yields, Disposition^{a/} and Quality of the Potato Crop, on 88 Farms, by Areas, 1949

Area	Yield	Grades marketed			Held	
	per				for	
	acre	First	Second	Total	seed	Culls
	- cwt. -		- per cent -			
Lethbridge	103	9	68	77	10	12
Vauxhall	163	4	72	76	11	12
Brooks	134	34	51	85	5	9
Medicine Hat	96	100	-	100	-	-
Edmonton	50	1	60	61	22	16
All irrigation	130	19	62	81	8	10
All areas	115	18	62	80	8	11

^{a/} About one per cent of the yield per acre was consumed by members of the farm family; as a result the sum of the percentages for the various channels of disposition is only 99.

Disposition and Quality of the Crop

Commercial producers must allow for culls, seed and home consumption in determining the amount of their marketable potatoes. Since domestic requirements are quite constant, the quantity marketed will be dependent largely on the quantity of potatoes culled and those used for seed. The proportion of culled potatoes depends to a large extent on the quality and size of the tubers and the amount lost in storage from sprouting

^{1/} See Table 1.

^{2/} Production and Marketing of Potatoes from the Irrigated Areas of Alberta. C.M. Kline. Published in The Economic Annalist, Vol. XIX.4 August 1949, p. 85.

^{3/} For other comparisons of yield between irrigated and dryland see: Relationship of Irrigation and Other Practices to Yields of Potatoes, Eastern Long Island, 1949. H.C. Bond and H.B. Vrooman. Department of Agricultural Economics. New York State College of Agriculture, Cornell University. New York. 1950, p. 10.

and disease. The proportion used for seed depends on the seeding practices of the farmer and on his yield level; those who change their seed often by purchases will require less of their own potatoes for this purpose; also, assuming that seed requirements per acre are approximately constant between farmers and between areas, a farmer with a higher yield level will have a smaller proportion of his potatoes devoted to seed than one with a low yield level. In the Edmonton area 61 per cent of the yield per acre (Table 27) was marketable; in the irrigation areas this proportion had increased to 81 per cent. The low proportion of marketable potatoes in the Edmonton area is due to the higher percentage of culls, 16 per cent in comparison with ten per cent for the irrigated areas. Also due to the lower yield level in the Edmonton area, the proportion of potatoes used for seed is 22 per cent, while in the irrigation areas with the higher yield level, this proportion is only eight per cent.

In addition to the improved yields, potatoes produced on irrigated land are better in quality than those produced on dryland. This is already indicated above by the higher proportion of marketable potatoes in the irrigation areas. It is further indicated by the higher proportion of potatoes in the irrigation areas which fall into the first grade: in the Edmonton area only one per cent of the potatoes marketed were in the first grade (Table 27); in the irrigated areas this proportion had increased to 19 per cent.

MARKETING OF POTATOES

Interviews with 88 commercial potato producers on dry and irrigated areas of Alberta indicated the important role of wholesale firms in distributing the 1949 potato crop. As a result of this information obtained from farmers, a follow-up study of potato marketing was made. While the production study pertains to the 1949 crop and was conducted during the summer of 1950, the wholesale study pertains to the 1950 crop and was conducted during the summer of 1951. The wholesalers were not sampled; rather, the representatives of all of the 27 firms in the province were interviewed; the marketing aspect of this study is therefore not subject to sampling error. It is, however, subject to non-sampling error; the most important of these are: (1) imports of mixed carlots of vegetables are common from California and British Columbia, as a result there is likely an over-statement of the quantity of potatoes imported; (2) some growers truck their potatoes directly to wholesalers and these sales do not appear in the carlot figures; (3) wholesalers' accounts of the quantity of potatoes handled are not always accurate.

The phases of marketing performed at the wholesale level vary between market areas and more specifically between wholesale institutions. Some firms wash the potatoes while others prefer to market them without washing; some handle potatoes for export, some provide storage facilities, some grade and prepack potatoes. In general the services performed by wholesalers may be classified into the following categories: (1) continuity

of supply and related functions, (2) grading and prepacking, and (3) financing.

Continuity of Supply

Continuity of supply is provided by the timely marketing of potatoes by wholesalers. The quantity and quality of the potatoes carried over from the previous year begins to decline early in the spring and wholesalers must resort to imports to replenish their supplies. The first imports appear during the middle of May and usually come from California. Harvesting of early potato varieties in British Columbia occurs early in June, and some imports are made from this province at this time. In spite of the tariff and freight advantages which British Columbia potatoes enjoy, potatoes continue to be imported from the United States as their tubers are of superior smoothness, size, and cleanliness. Imports from the United States and British Columbia continue until the early season crop is harvested in Alberta. Harvest of early potatoes in Alberta begins near the end of July and continue until mid-September; during this time imports of potatoes are reduced sharply and wholesalers depend chiefly on locally produced early potatoes for their supplies. After mid-September the late maturing Alberta potatoes are harvested and imports cease entirely. The demand for commercially produced potatoes is not strong at this time as many families have the supplies of their own gardens available; as a result, the bulk of the commercially produced crop goes into storage, most of it on farms, and a small amount in commercial warehouses. As garden supplies of potatoes become depleted towards the latter months of the year, and in the new year, the demand for commercial potatoes strengthens. In the new year the demand for commercial potatoes is further strengthened by the increased demand for imports on the part of the adjoining provinces.

The seasonal variation of prices which results from the above pattern of supply and demand of potatoes throughout the year is indicated in Table 28. The index of the seasonal variation of prices reached a peak of 150 in July; the peak of the index coincides with the lowest level of supplies which at this time comprise only imports from the United States and British Columbia, the carryover from last year being depleted. The index dropped to 139 in August, the drop arising from the harvesting and marketing of Alberta early potatoes. The index declined to 98 in September, 84 in October, and to a low point of 79 in the months of November and December; this decline is associated with the harvesting of the main crop of late varieties of potatoes by the commercial and non-commercial growers; 1/ although the bulk of the commercial crop is held off the market, the decline in prices arises from a reduced demand due to the utilization of the non-commercial crop. The index rose gradually from 84 in January to 100 in May, and somewhat more steeply to 111 in June. The rise of the index at this time is associated with the increased demand for export and the depletion of the commercial and non-commercial stocks.

1/ For a definition of commercial and non-commercial growers see pp. 3-5.

Table 28.- Index of Seasonal Variation of Potato Prices at Retail,
on the Edmonton Market, Average 1940-1948 Period

Month	Index
- 100 = average monthly price 1940-48 -	
January	84
February	87
March	91
April	99
May	100
June	111
July	150
August	139
September	98
October	84
November	79
December	79

a/ Linear trend removed.

Source: Unpublished data sampled for computing the level of living index at Edmonton, 1940 to 1949, Department of Political Economy, University of Alberta. Similar information for other marketing centres is not available.

The index of seasonal variation of potato prices in Table 28 is an average of the seasonal movements for the nine years from 1940 to 1948 inclusive for the Edmonton market.^{1/} There is a considerable year-to-year variation of the seasonal movement in accordance with the variation of output of potatoes in Alberta and the adjoining provinces of British Columbia and Saskatchewan. For the other marketing centres the average seasonal movement and the seasonal movement in individual years are likely approximately the same; this is because existing transportation facilities make possible a rapid movement of potatoes from the surplus to the deficient areas.

The estimated handlings of potatoes by wholesalers which was necessary to provide continuity of supply in 1950 are indicated in Table 29. The 27 wholesale houses in the five ^{2/} market centres of Alberta handled 2,248 carlots in 1950. Allowing 261 carlots for duplicate sales arising from transfers between wholesalers, a total of 1,987 carlots was available for disposal. The bulk of wholesalers' supply, or 1,708 carlots, came from Alberta; this total includes 1,522 carlots of late, 156 carlots of early and 30 carlots of seed potatoes; 195 carlots were imported from California and 84 from British Columbia. The majority of the sales, or 1,334 carlots, were in Alberta, and sizeable exports, 373 and 248 carlots, were made to the adjoining provinces of Saskatchewan and British Columbia, respectively. Twenty-seven carlots were sold in Manitoba and Ontario and five in Montana.

^{1/} Only retail price information is available.

^{2/} The five marketing centres are Edmonton, Calgary, Lethbridge, Medicine Hat, and Brooks. There were ten wholesalers in Edmonton, seven in Calgary, six at Lethbridge, three at Medicine Hat and one at Brooks.

Table 29.- Estimated Total Purchases and Sales of Potatoes by 27 Wholesalers in the Five Market Centres in Alberta, 1950

	a/ Number of carlots
Gross Handlings	2,248
Duplicate Handlings	<u>261</u>
Net Handlings	1,987
Purchases of: California Early	195
British Columbia Early	83
British Columbia Late	<u>1</u>
Total imports	279
Alberta Certified Seed	30
Alberta Early	156
Alberta Late	<u>1,522</u>
Total from Alberta	<u>1,708</u>
Total Purchases	1,987
Sales to: Alberta	1,334
Saskatchewan	373
British Columbia	248
Manitoba	17
Ontario	10
Montana	<u>5</u>
Total Exports	<u>653</u>
Total Sales	1,987

a/ One carlot contains 22.5 tons of potatoes except carlots imported from the United States which contain 18 tons.

The disposal of the 1,708 carlots of potatoes obtained from Alberta growers (Table 29) is indicated in Table 30. The bulk of the Alberta produced potatoes also were marketed in Alberta; of the 1,522 carlots of late potatoes, 905 were sold in Alberta. Of the 156 carlots of early, 120 were sold in the home province and out of a total of 30 carlots of seed potatoes all were sold in Alberta. Adding the 279 carlots of imports (Table 29) the total sales to retailers in Alberta amounted to 1,334 carlots (Tables 29 and 31). The majority of Alberta's exports to Saskatchewan and British Columbia were late potatoes (Table 30); out of the total of 373 and 248 carlots exported to these provinces 356 and 229 carlots respectively were late varieties. The entire exports of 32 carlots to Manitoba, Ontario, and Montana, consisted of late varieties.

Table 30.- Estimated Sales at Wholesale of Alberta Produced Potatoes, Five Marketing Centres, 1950

Crop	Sales to:				
	Alberta	Saskatchewan	British Columbia	Manitoba	Ontario and
				Montana	Total
- carlots -					
Early	120	17	19	-	156
Late	905	356	229	32	1,522
Seed	30	-	-	-	30
Total	1,055	373	248	32	1,708

The importance of the various cities as marketing centres is indicated in Table 31. Calgary, Lethbridge and Edmonton were the three largest marketing centres, handling 760, 610 and 474 carlots of potatoes respectively; Calgary, Edmonton and Lethbridge, with 597, 467 and 238 carlots respectively, were the three most important centres in the sales of potatoes to Alberta. On the other hand, Lethbridge, Calgary and Brooks, with exports of 372, 163 and 75 carlots out of a total of 653, were the three most important exporting centres.

Table 31.- Estimated Sales and Exports of Potatoes at Wholesale, by Marketing Centres, 1950

	Sales in	Exports from	Total
	Alberta	Alberta	
- carlots -			
Calgary	597	163	760
Lethbridge	238	372	610
Edmonton	467	7	474
Brooks	27	75	102
Medicine Hat	5	36	41
All centres	1,334	653	1,987

Although farmers provide most of the storage function, wholesale firms must provide supplementary storage in order to ensure a continuity of supply at all times. Wholesalers must have facilities to provide storage for two to three weeks' supply as a hedge against unfavourable weather conditions which would hamper movement of potatoes from farms to wholesalers or from one city to another. Wholesale firms also require storage facilities to extend the supply of domestic potatoes until the beginning of the import season.

Grading and Prepacking

Very little grading is required for early varieties as they are usually sold on a field-run basis. The late varieties require a greater amount of grading as they are subject to sprouting, deterioration and disease during storage, and to knob formation when adverse weather conditions cause varying rates of tuber development. All commercial late potatoes for local markets within the province are graded according to the standard established under the Vegetable Sales Act of Alberta 1/ and for interprovincial trade according to the Fruit, Vegetables and Honey Act 2/. Grading may be done at the farm or wholesale house 3/ and is a matter of selecting tubers on the basis of size, shape, cleanliness, and freedom from disease. Grading of potatoes on the farm consists of separating them into Canada No. 1 and No. 2 grades, with the majority of them being in the latter grade (Table 26). Grading at the wholesale level is done on potatoes bought on a field-run basis and also on potatoes graded on the farms which must be upgraded for prepacking purposes; 4/ the latter procedure is required as consumers who demand potatoes in small packages also want them to be of high quality.

Prepacking consists of breaking up 100 pound bags of potatoes into smaller packages containing either 50, 25, ten or five pounds of potatoes. Potatoes to be prepackaged are usually of top quality and in some cases are wrapped in cellophane or plastic containers in order to provide an attractive appearance. Prepacking has grown in popularity since 1945 and is one of the results of an increase in per capita incomes. Table 32 includes the extent of prepacking of late potatoes in Alberta in 1950. Of the 905 carlots of late potatoes sold in Alberta (Table 30) 398.5 carlots or about 44 per cent were sold in 100 pound bags; the majority of these sales were made in the Edmonton, Lethbridge, and Calgary centres where 183.4, 126.8 and 83.2 carlots were prepacked in this manner. In all centres only a very small amount, 39.1 carlots or about four per cent of the potatoes were sold in 50 and 25 pound bags. The majority of urban consumers preferred ten pound bags; out of the 905 carlots, 435.4 carlots or about 48 per cent of the total late potatoes were sold in this type of bag. The largest amount of prepacking in ten pound bags occurred in the Calgary and Edmonton areas with 271.7 and 100.2 carlots respectively.

1/ Regulations governing the Sale of Vegetables. The Vegetable Sales (Alberta) Act. Order-in-Council 1144-49, 1949. p. 709.

2/ Fruits, Vegetables and Honey Act and Regulations. Canada Department of Agriculture, Marketing Service, Fruit and Vegetable Division. Revised 1951. pp. 1-19 and 75-79.

3/ Seventeen of the 27 wholesale establishments maintained potato grading facilities.

4/ Of the 27 wholesalers, 14 reported prepacking potatoes; of these only ten graded their potatoes; this leaves four wholesalers who prepacked potatoes without at the same time reggrading them.

Table 32.- Prepacking of Late Varieties of Potatoes in Alberta by Size of Bag and by Marketing Centres, 1950

Centre	Total : cars	100 pound : bags	50 and 25 : pound bags	10 pound : bags
- carlots -				
Calgary	387	83.2	32.0	271.7
Edmonton	317 <u>a/</u>	183.4	1.5	100.2 <u>b/</u>
Lethbridge	184	126.8	5.0	52.2
Medicine Hat	12	2.6	0.6	8.8
Brooks	5	2.5	-	2.5
All centres	905	398.5	39.1 <u>c/</u>	453.4

a/ No information is available on the manner of prepacking of 32 carlots in the Edmonton area.

b/ Of the total of 100.2 carlots which were prepacked in ten pound bags, 5.8 carlots were prepacked in five pound bags.

c/ Of the total of 39.1 carlots, 17.0 carlots were prepacked into 50 pound bags and 22.1 carlots into 25 pound bags.

Financing

One significant uniformity exists in all the market centres with respect to purchases. None of the wholesalers felt that potatoes could be satisfactorily handled other than on a cash basis at the time of delivery. Contracts for future delivery at a specified price were not undertaken because of the possible changes in prices which could arise from a change in supply and consequently of export demand on the part of the provinces adjoining Alberta. Financing the crop purchases on a cash basis shifts the major portion of the price risk upon the farmer rather than the wholesaler. In addition, this manner of financing probably favours the existence of cycles in the prices and output of potatoes; this is likely true as growers are less able than wholesalers to gauge future prices.

Sources of Information on Potato Marketing

Existing government publications and other sources give some additional information on the marketing of potatoes. The Marketing Service of the Canada Department of Agriculture issues monthly quotations 1/ on the average wholesale and retail prices for the major market centres in each province; this series, however, is available only for a short period of years. An historical series of farm prices 2/ for potatoes is available for Alberta but not for specific market centres. Another publication

1/ Crop and Seasonal Price Summaries, Fresh Fruits and Vegetables. Vol. IV, 1950-51. Canada Department of Agriculture. Marketing Service, Marketing Information Section. Ottawa.

2/ Dominion Bureau of Statistics, Quarterly and Monthly Bulletin of Agricultural Statistics, 1931 to 1951 inclusive.

gives the size of the marketing margin ^{1/} for potatoes for the year 1935 to 1949 inclusive.

SUMMARY

In the last three decades the emphasis has been shifting from non-commercial to commercial potato production in Alberta. The increased commercialization of the industry may be attributed to: (1) the shift of a large portion of the potato output from dryland to irrigated areas, and (2) the demand by the consumer for better quality potatoes and improved packaging.

On most farms, growing potatoes commercially was supplementary to other farm enterprises. In the irrigation areas the potatoes were combined with forage crops, sugar beets or canning crops, and summerfallow. On potato farms in the dryland areas, the acreage of forage crops was somewhat smaller, but acreages of grains and summerfallow were considerably larger. Sugar beets and canning crops were not grown in the dryland areas,

General equipment such as tractors, irrigation and tillage machinery was partly used in potato production, but a large amount of specialized potato equipment was also necessary. The typical grower had a planter and a digger and at least one other specialized potato machine such as a sprayer, duster, conveyor or grader. Potatoes competed with other farm enterprises in the use of labour. Labour is required for irrigation, hoeing and harvesting at the same time as for other crops; this necessitates some hired labour for potatoes, particularly in the hoeing and harvesting seasons.

On most farms it was economical to produce late-season varieties as the main crop of potatoes. A large number of growers, however, also found it economical to combine a small acreage of early-season potatoes with their main crop. High yields and high quality are also important for economic production. Growers attempted to obtain high yields of potatoes by the use of light to medium textured soils, timely irrigation, application of fertilizer, and the chemical control of insect pests. To obtain high quality tubers, growers changed their potato seed and the location of their potato enterprise frequently. As one precaution against disease, it was also a common practice to treat tubers chemically. Most growers also found that they could not produce the high quality of potatoes required by wholesalers without bagging, storing and some grading of potatoes on farms.

The marketing information was obtained by interviews of the 27 wholesalers in the province. The main function of wholesalers was to provide continuity of supply. This consists of having potatoes

^{1/} Marketing Margins for Selected Agricultural Products, 1935-49.
Economics Division, Marketing Service. Canada Department of Agriculture.
Ottawa. September, 1950.

available when they are desired by consumers. Since potatoes are produced seasonally, this function requires (1) the proper timing of imports, exports and local purchases and sales and also (2) the undertaking by wholesalers of certain related functions of storage and financing of purchases. Complete uniformity in the continuity of supply was impossible and prices of potatoes exhibited a distinct seasonal pattern.



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